

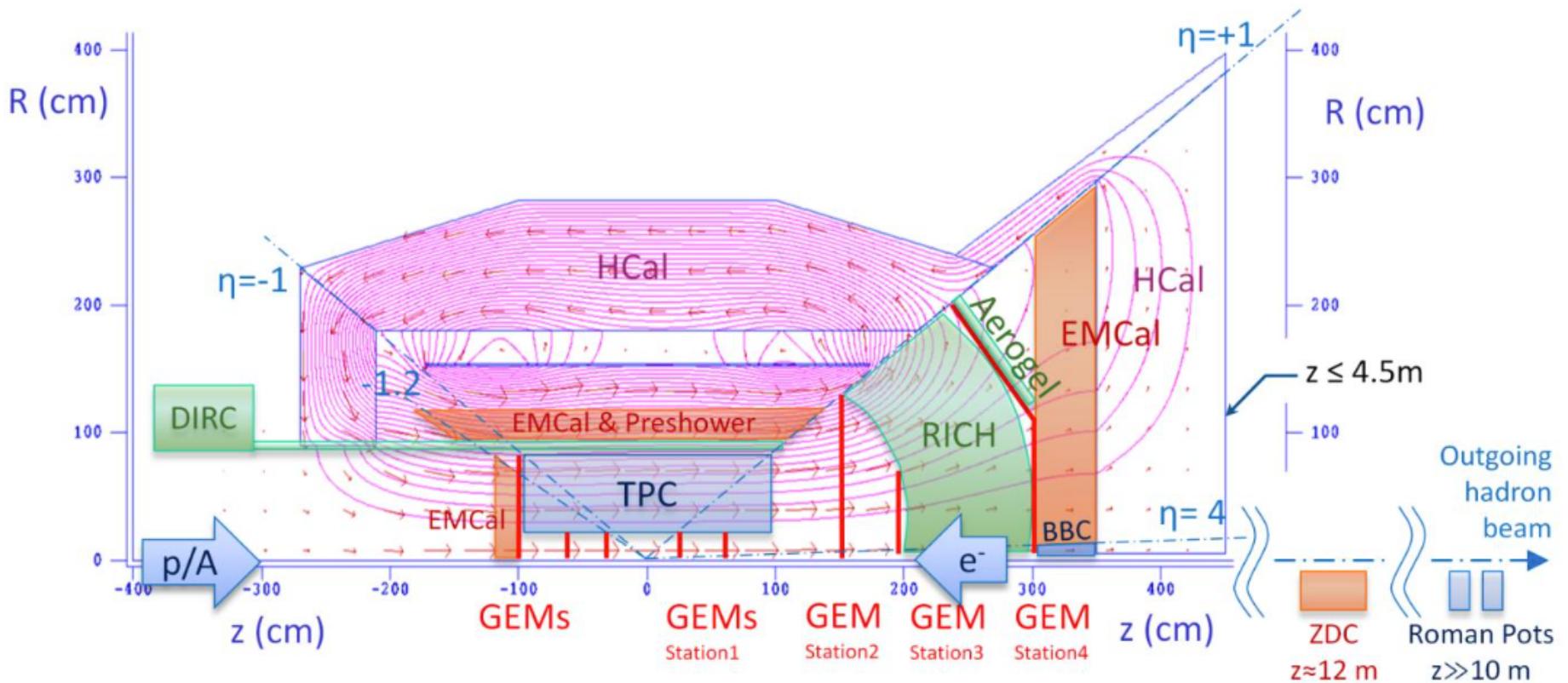
# DVCS process simulation for EIC

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# Electron Ion Collider Detector



# Deep Virtual Compton Scattering

Deeply Virtual Compton Scattering (DVCS) is the exclusive production of a real photon in diffractive lepton – hadron interactions :  $ep \rightarrow e\gamma$ . Process is calculable in pQCD (NLO) and cross section depends on GPD.

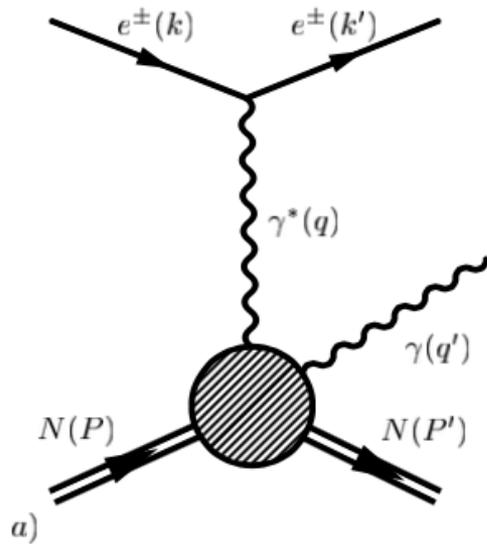
arXiv:hep-ph/0411389v1 E. Perez, L. Schoeffel, L. Favart

Simulation code milou:

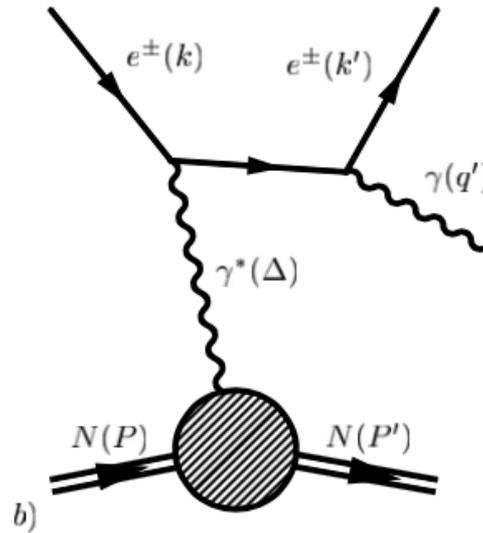
<https://wiki.bnl.gov/eic/index.php/MILOU>

# Deep Virtual Compton Scattering

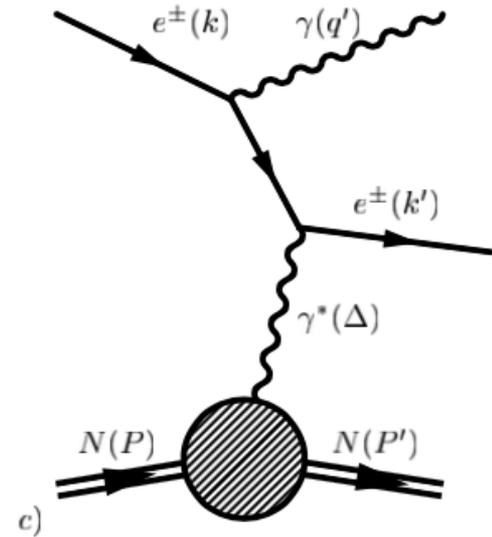
Process :  $ep \rightarrow ep\gamma$ . Simulation code milou:



DVCS : pQCD



BH : EM

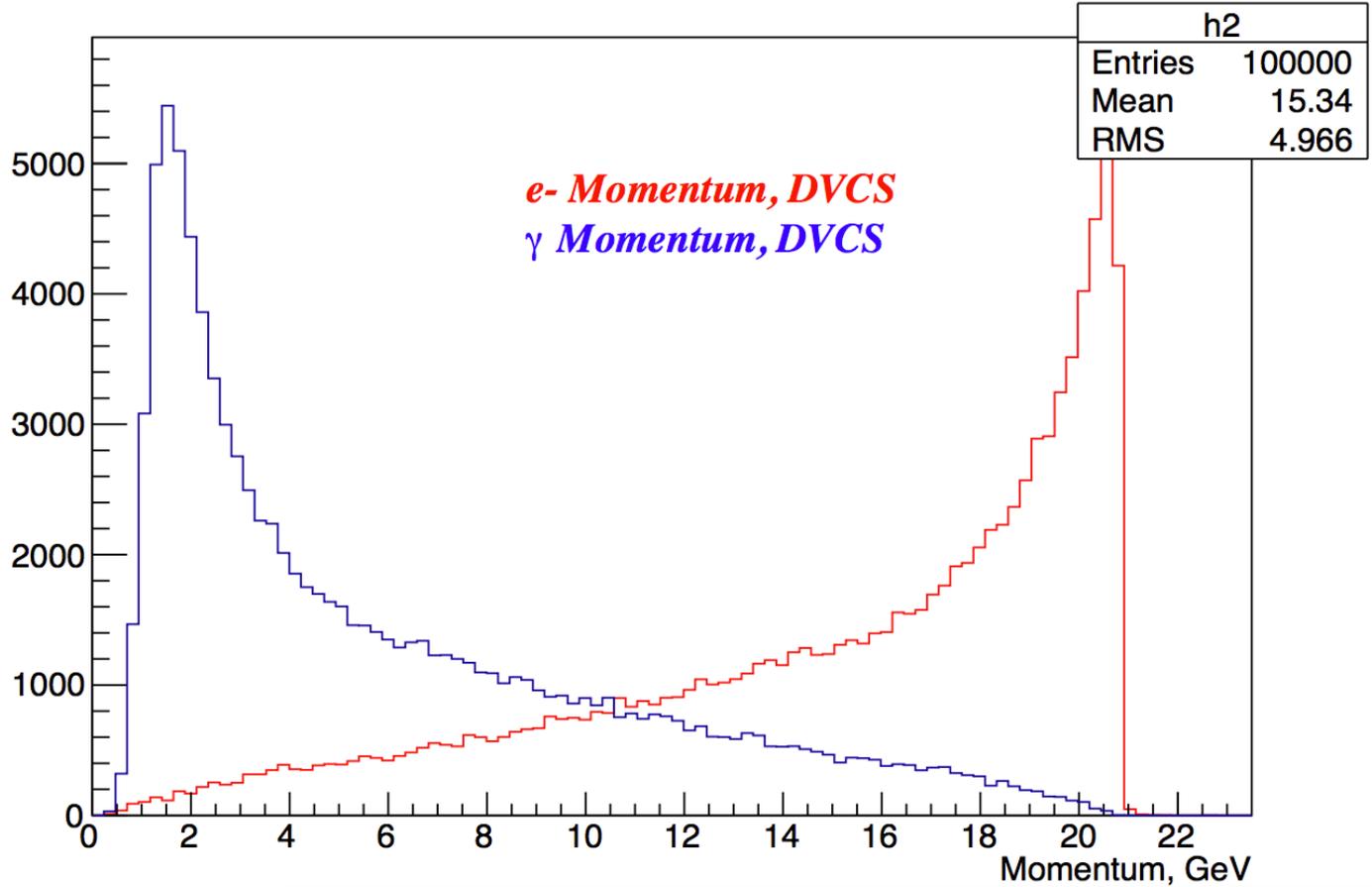


# Simulation: milou

- Simulation performed for proton 250 GeV/c & electron 21 GeV/c
- Four processes simulated
  
- 1) Bethe-Heitler (BH)
- 2) Deep Virtual Compton Scattering (DVCS)
- 3) Interference between BH and DVCS (INT)
- 4) BH + DVCS + INT
- Totally 4 samples
- Analyzed samples (1) and (4)

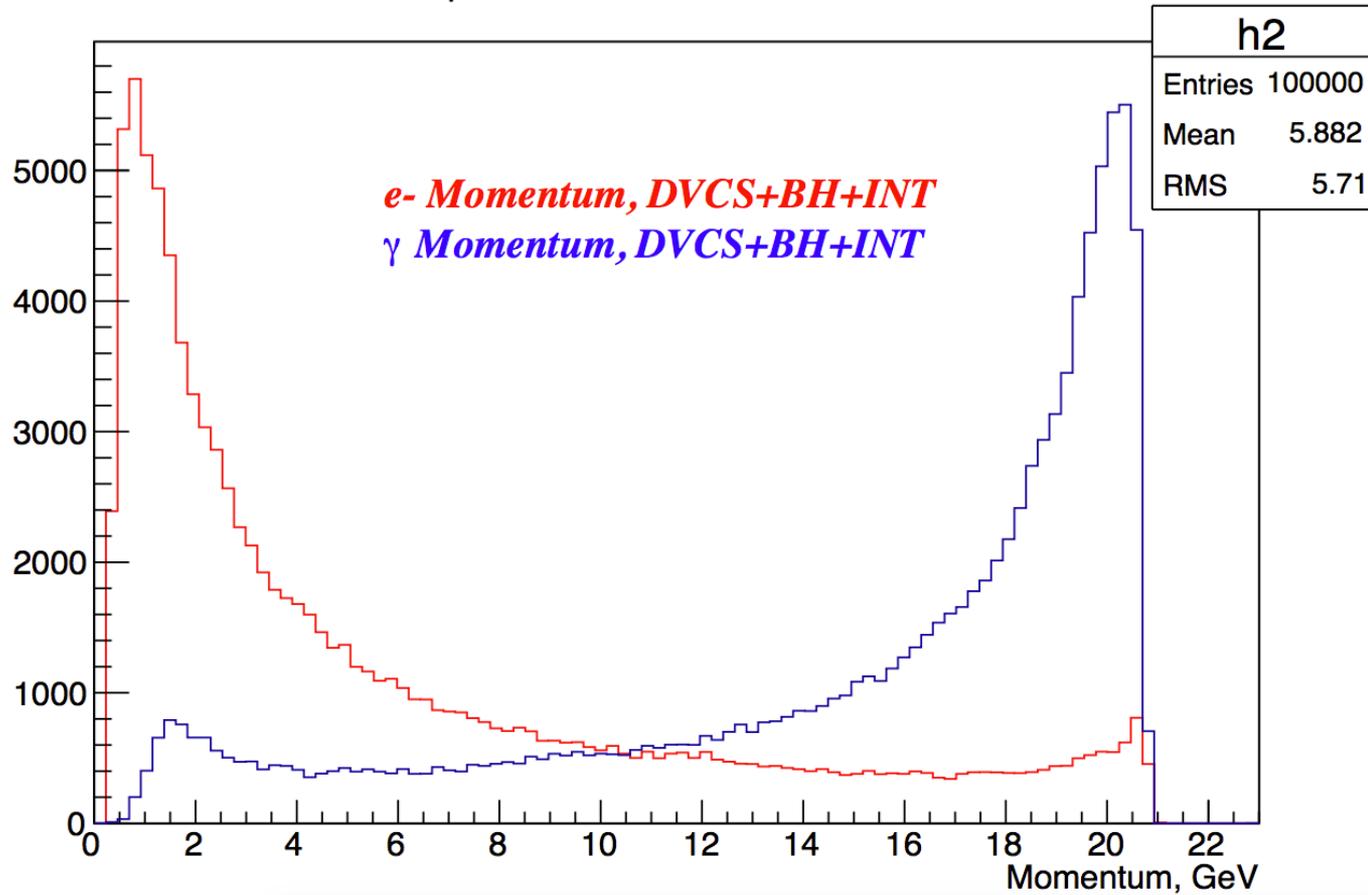
# Milou Simulation

e- and  $\gamma$  Momentum, DVCS



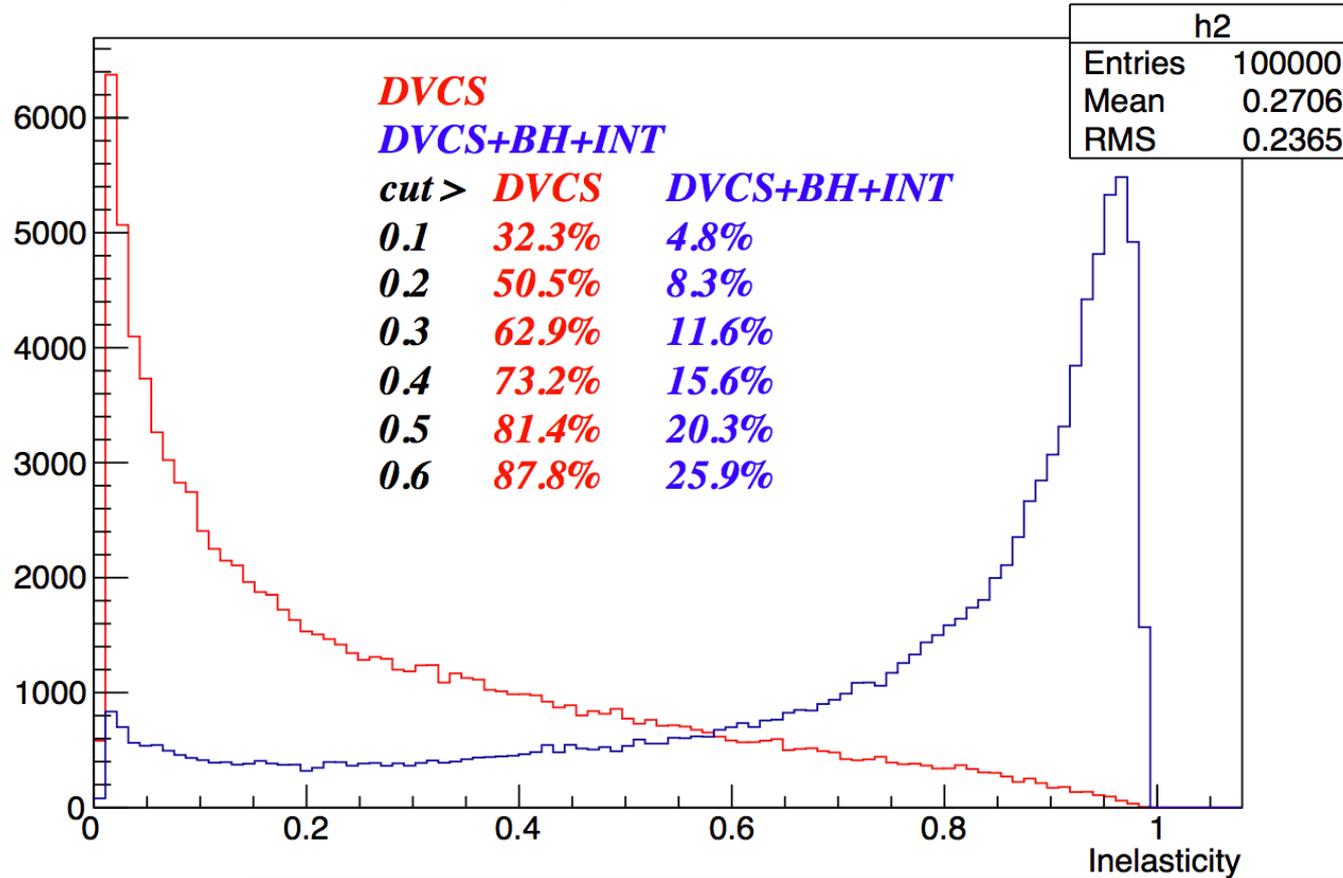
# Milou Simulation

e- and  $\gamma$  Momentum, DVCS+BH+INT

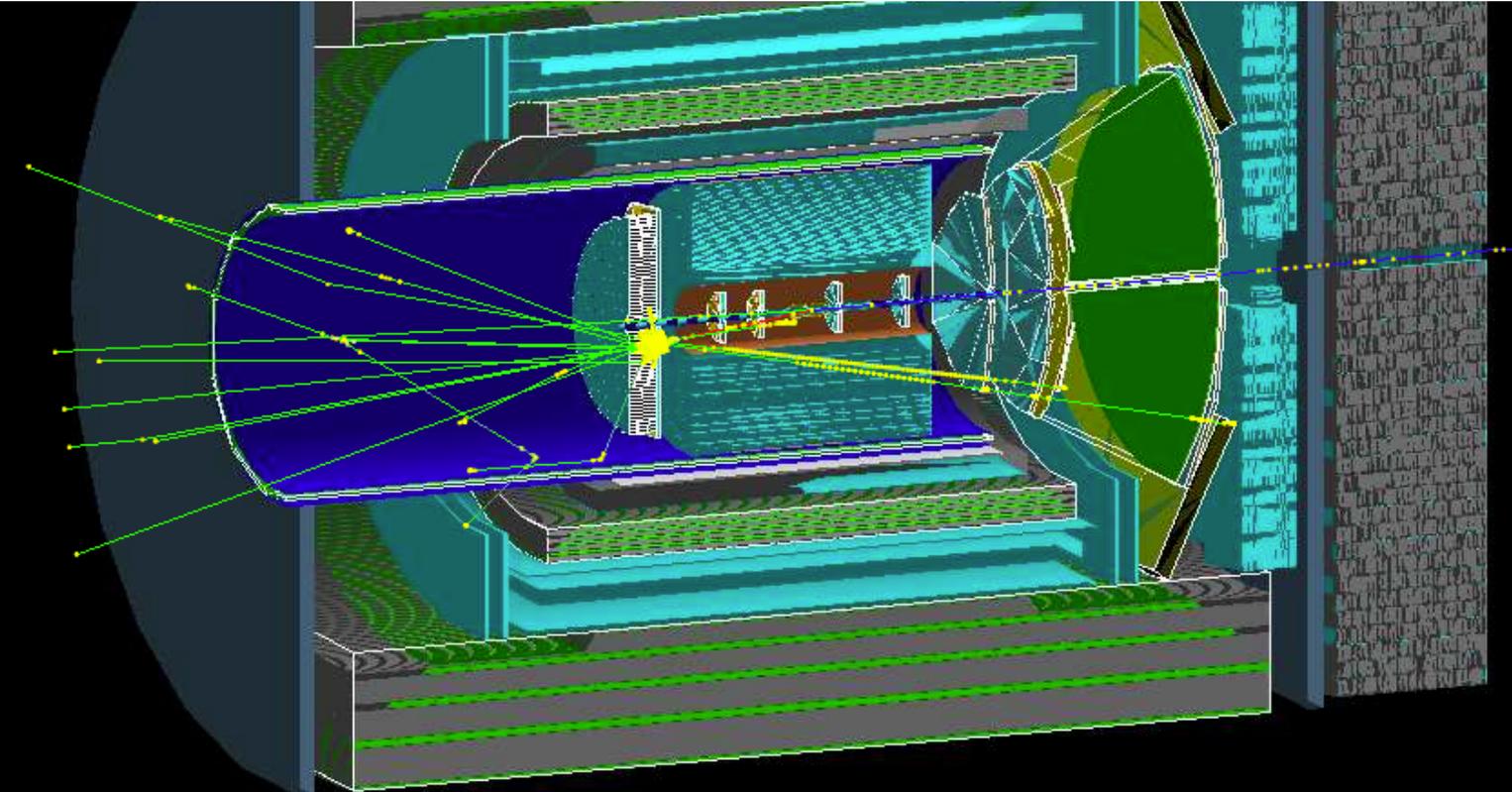


# Milou Simulation

Inelasticity =  $1. - pe\_out/pe\_in$



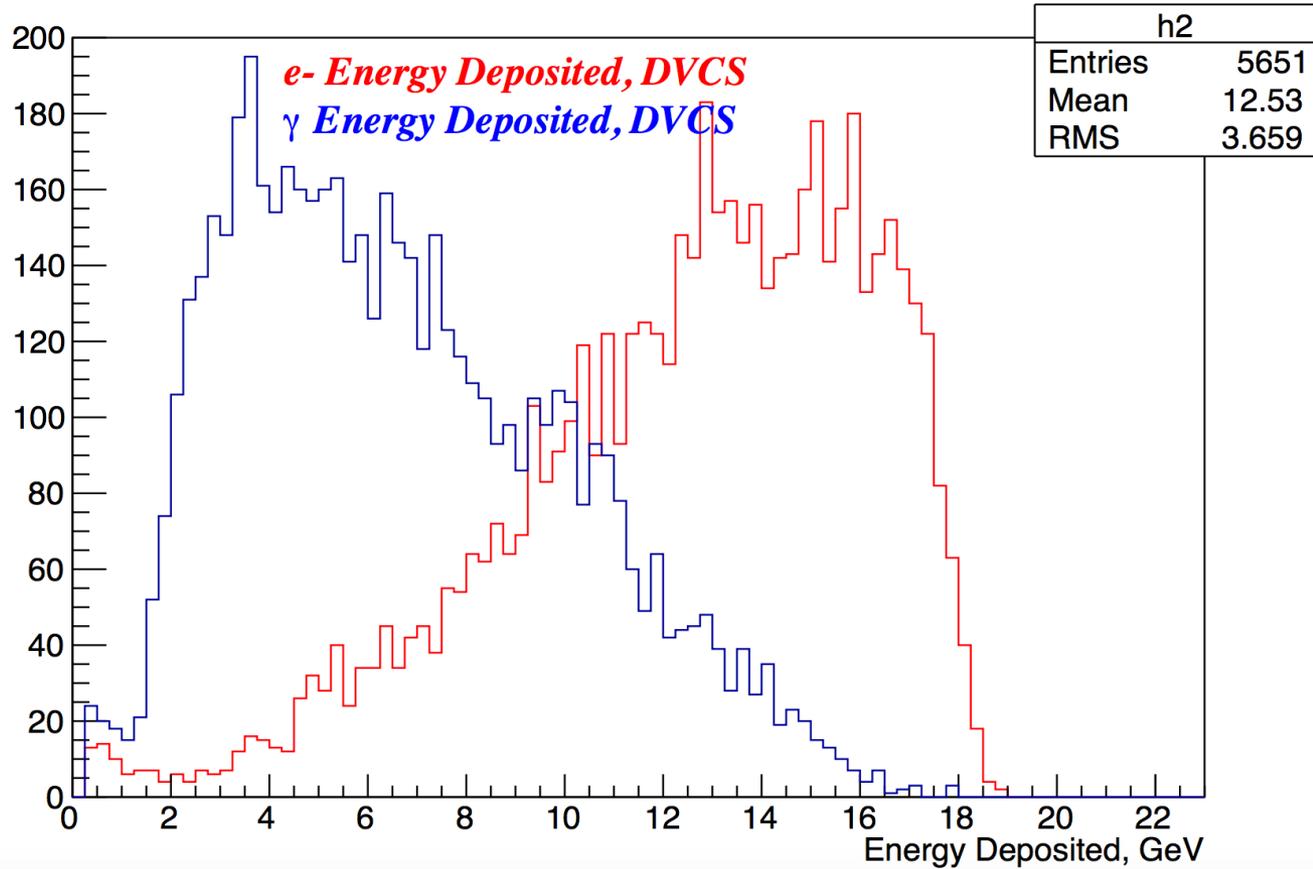
# G4 Detector Respond



e- 21.0 GeV/c  
pr 250.0 GeV/c  
e- 5.1 GeV/c  
 $\gamma$  15.9 GeV/c  
pr 249.96 GeV/c

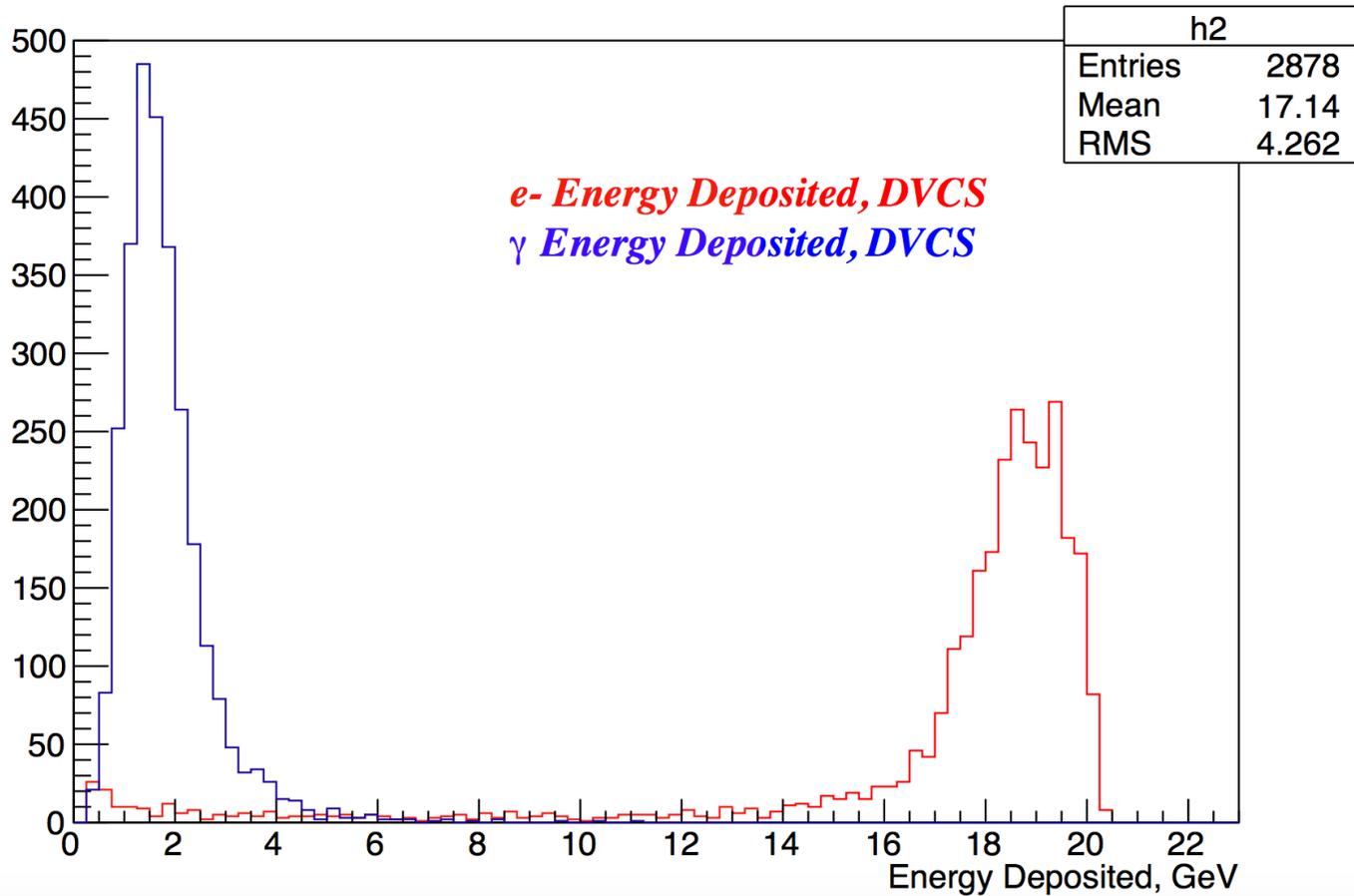
# G4 Simulation

e- and  $\gamma$  Energy Deposited, DVCS, both e- &  $\gamma$  in EEMC



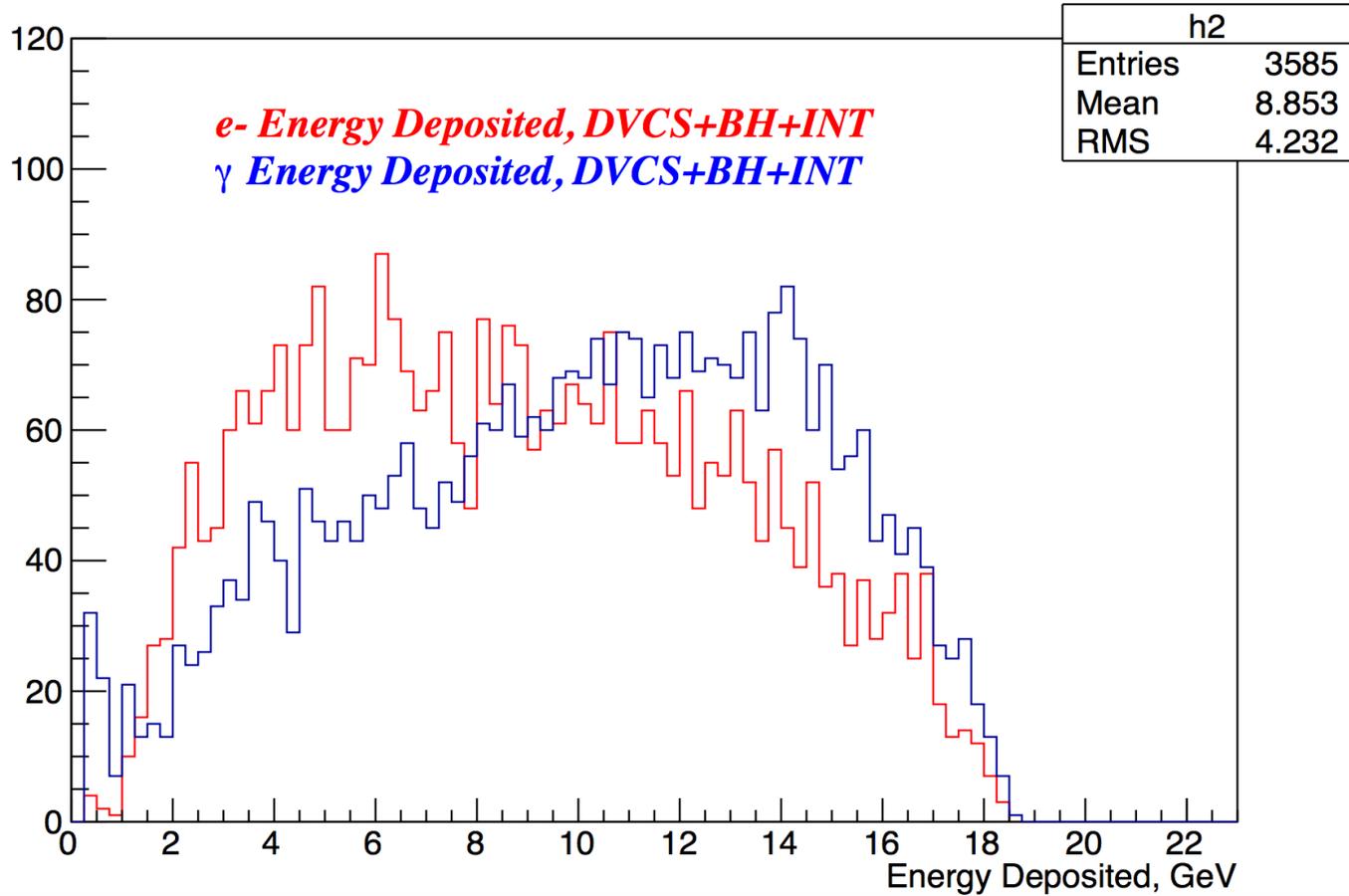
# G4 Simulation

e- and  $\gamma$  Energy Deposited, DVCS, e- in EEMC,  $\gamma$  in Barrel



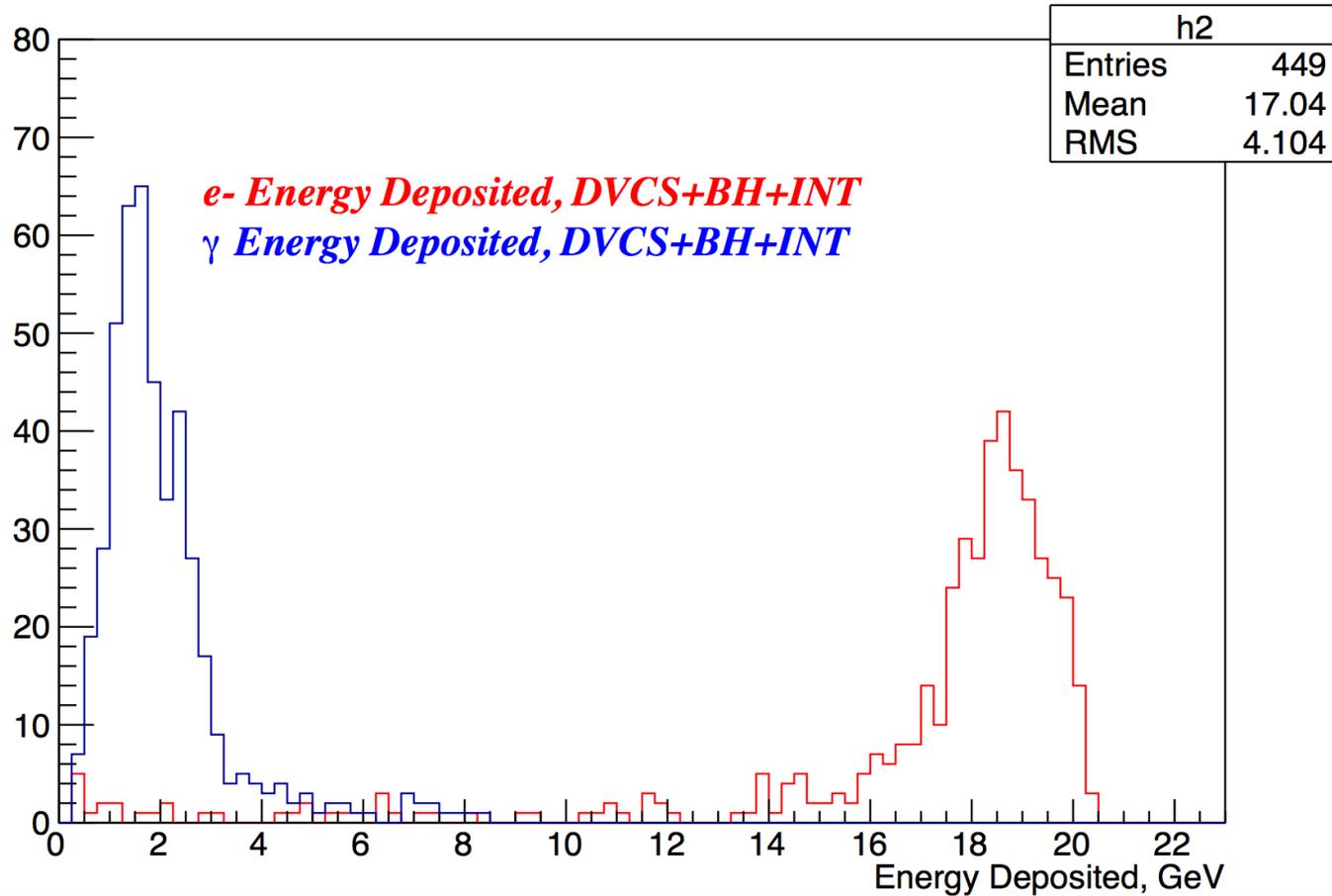
# G4 Simulation

e- and  $\gamma$  Energy Deposited, DVCS+BH+INT, both e- &  $\gamma$  in EEMC



# G4 Simulation

e- and  $\gamma$  Energy Deposited, DVCS+BH+INT, e- in EEMC,  $\gamma$  in Barrel



# G4 Simulation

Type	Total simulated	Selected: 250 MeV, both e- & $\gamma$ in PbWO4	Selected: 250 MeV, e- in PbWO4, $\gamma$ in Barrel	Total Selected	% of Total selected
DVCS	10K	5651	2878	8529	85.3
DVCS+BH+INT	10K	3585	449	4034	40.3

Detection efficiency of the DVCS process is 85.3% and detection efficiency of the DVCS+BH+INT process is ~40.3%.

# G4 Simulation

Electron Inelasticity cut  $< 0.5$

Type	Total simulated	Selected: 250 MeV both e- & $\gamma$ in PbWO4	Selected: 250 MeV e- in PbWO4, $\gamma$ in Barrel	Total Selected	% of Total selected
DVCS	10K	4135	2648	6783	67.8
DVCS+BH+INT	10K	1304	416	1720	17.2

Detection efficiency of the DVCS process is 67.8% and detection efficiency of the DVCS+BH+INT process is 17.2% after applying Inelasticity cut of 0.5.